The Emergence of Natural Gas and the Need for Cooperative Federalism to Address a Big "Fracking" Problem

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I. INTRODUCTION

The regulatory scheme currently in place to protect against the dangers of hydraulic fracturing is a patchwork of state regulation, which has left many who have been affected without recourse as oil and gas companies continue to exploit this valuable commodity. As citizen complaints continue, we must look closely at our current regulatory system and determine whether it is adequate given our current drilling practices and growing appetite for natural gas. Although some states may take a harder stance on oil and gas companies and hydraulic fracturing operations, others have done too little. This system may lead natural gas companies frustrated with inconsistent regulations and a more mobile public uncertain of the regulatory scheme in place to protect their health, from state to state. In contrast, across the board national standards for hydraulic fracturing operations may ignore region-specific needs, which may require stricter regulation. Therefore, to properly safeguard the public from the dangers of hydraulic fracturing but still allow for regulation tailored to a specific region's needs, a system of cooperative federalism is the most desirable approach.

Hydraulic fracturing, or "fracking" as it is more commonly called, is the process of injecting large quantities of fluid into rock formations, inducing fractures within the rock and releasing natural gas from the rock's pores. With the advent of drilling techniques like hydraulic fracturing, oil and gas companies have been able to extract large quantities of natural gas from deposits deep underground once thought to be economically infeasible to recover. America is blessed with an abundance of natural gas, and as our country begins to shift away from coal to meet our energy needs, more reliable and cleaner burning natural gas is poised to fill the gap.As the threat of climate change continues to grow, the need to drastically reduce our greenhouse gas emissions becomes more of a priority. Many have praised natural gas because it is not only abundant within American soil, but it also releases less pollutants and greenhouse gases when burned, as compared to coal. However, praises aside, natural gas production is not without its costs. Special interest groups have fought hard to stop any attempts by the federal government to regulate hydraulic fracturing, despite complaints of drinking water contamination, environmental impacts, and public health concerns related to hydraulic fracturing operations.

This Comment explores the recent emergence of natural gas production, the hydraulic fracturing process and briefly touches on the current regulatory system that oversees its operation. I then explain why the current regulatory system is insufficient to protect individuals and the environment from hydraulic fracturing. And lastly, I argue that a form

of cooperative federalism is the best approach to regulate hydraulic fracturing.

II. CLIMATE CHANGE AND NATURAL GAS PRODUCTION

The ongoing threat of climate change has forced us as a nation to look seriously at reducing our greenhouse gas emissions.[1] Natural gas may seem like a viable alterative to reducing our greenhouse gas emissions without completely eliminating our reliance on fossil fuels. In comparison to oil, which is still primarily imported from volatile foreign sources like the Middle East, natural gas is a reliable substitute. Eighty-four percent (84%) of natural gas consumed in the U.S. is produced in the U.S., and 97% of the natural gas we consume is produced within North America.[2] From an emissions standpoint, natural gas emits half the amount of carbon dioxide as coal, and 30% less carbon dioxide then fuel oil.[3]

Forty-two percent (42%) of the country's electricity production still comes from coal-fired power plants.[4] However, as coal resources begin to dwindle, making it more expensive to exploit, and the public becomes increasingly aware of the negative environmental and health effects associated with the burning of coal, the need for cleaner alternative energy sources becomes increasingly important. A complete shift to clean and renewable energy sources such as wind or solar, although ideal, is highly unlikely in the near future, as only about 13% of our current energy supply comes from renewables.[5] So as these renewable sources are slowly phased into our nation's energy grid, and "dirty" energy like

1. The 2007 IPCC assessment on climate change concluded that warming is unequivocal, based on evidence of global surface temperatures, changes in precipitation patterns, and observations of ocean and arctic temperatures. John C. Dernbach & Seema Kakade, *Climate Change Law: An Introduction*, 29 ENERGY L.J. 1, 3 (2008). The increase in temperature is very likely due to increases in anthropogenic greenhouse gas emissions. *Id.* at 4. Global greenhouse gas emissions increased 70% between 1970 and 2004, with the largest growth coming from the energy supply sector. *Id.* The United States is the largest energy producer and consumer in the world, accounting for about one fourth of the world's annual energy use. *Id.* at 5.

2. DEPT. OF ENERGY, MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES 5 (Apr. 2009), *available at* http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf.

3. *Id.*

4. U.S. Energy Info. Admin., *Electricity in the United States–Energy Explained, Your Guide to Understanding Energy*, U.S. ENERGY INFORMATION ADMINISTRATION (EIA) http://www.eia.gov/energyexplained/index.cfm?page=electricity_in_the_united_states (last updated Feb. 7, 2013).

5. *Id.*

coal is phased out, natural gas will play an increasingly larger role in meeting our energy demands in the intermediate.

"Natural gas . . . is a combustible fossil fuel often found in underground reservoirs and comprised of methane and other hydrocarbon compounds."[6] Many regard natural gas as the ideal fossil fuel because of its efficiency, relative cleanliness, and its relatively low delivered cost.[7] The United States is blessed with an abundant supply of natural gas resources. In 2005, the National Petroleum Council estimated that the U.S. alone has 1,451 trillion cubic feet (TCF) of natural gas.[8] That estimated number has since gone up. In 2011, the Energy Information Administration estimated that the United States possesses approximately 2,552 TCF of potential natural gas resources, enough to supply the United States for approximately 110 years.[9] While natural gas may be taken from a variety of sources, one of the largest and most publicized sources has been shale gas.[10] Shale gas is found within shale formations.[11] These formations typically function as both the reservoir and the source for the gas.[12] The gas itself can be found throughout the shale formation within the large or small pores of the shale rock.[13] The organic matter deposited within the shale matrix generates the natural (methane) gas.[14] The amount of technically recoverable shale gas in the U.S. today stands at 862 TCF, making the country's shale gas resources the second largest in the world.[15] Four main shale gas reservoirs in the United States will play the largest role in the production of shale gas in the coming years. The Haynesville, Fayetteville, Marcellus and Woodford shale reserves' combined recoverable gas totals 550 TCF,[16] or approximately 63% of the nations total shale gas resources.

All that natural gas does us no good, however, without access to a means of extracting the resource safely and economically without seriously endangering the public welfare. It is hoped that hydraulic fracturing and

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6. *Natural Gas News–The New York Times*, N.Y. TIMES, http://topics.nytimes.com/top/news/business/energy-environment/natural-gas/index.html (last updated June 13, 2012).

7. James M. Inhofe & Frank Fannon, *Energy and the Environment: The Future of Natural Gas in America*, 26 ENERGY L.J. 349, 349 (2005).

8. *Id*. at 363.

9. U.S. H.R. COMM. ON ENERGY AND COMMERCE MINORITY STAFF, CHEMICALS USED IN HYDRAULIC FRACTURING 2 (Apr. 2011).

10. It is estimated that Americans shale deposits hold several hundreds of trillions of cubic feet of gas. Inst. for Energy Research, *Technically Recoverable Shale Gas Resources Jump 134 Percent*, INST. FOR ENERGY RESEARCH (May 16, 2011), http://www.instituteforenergyresearch.org/2011/05/16/technically-recoverable-shale-gas-resources-jump-134-percent/.

11. DEPT. OF ENERGY, *supra* note 2, at 14.

12. *Id.*

13. *Id*. at 15.

14. *Id.*

15. Inst. for Energy Research, *supra* note 10.

16. DEPT. OF ENERGY, *supra* note 2, at 10.

horizontal drilling will be those pivotal means.[17] Hydraulic fracturing and horizontal drilling have brought a welcome supply of previously inaccessible shale gas, which has in turn brought natural gas prices down.[18] Prior to the application of these two technologies, production in the shale gas basins was not viewed as economically feasible.[19] Although the two processes are often used in conjunction with one another, this comment focuses mainly on hydraulic fracturing because of its potential impacts on the environment and public health. However, horizontal drilling has and will likely continue to play a large role in the exploitation of our country's shale gas reserves.[20]

III. HYDRAULIC FRACTURING OVERVIEW

Our country's voracious energy needs and increasing reluctance to rely on coal will likely create a constant demand for a reliable and abundant supply of natural gas for the foreseeable future. As large reservoirs of unconventional gas are discovered, and new technology is developed to tap those reservoirs, gas companies stand ready and willing to meet that demand. From this perspective, it would appear that natural gas is poised to be the energy source of the future because it is cleaner and more reliable than coal or oil. However, that bright future looms under the shadow of hydraulic fracturing. Much of the current extraction is occurring through this well-established and increasingly popular method, which allows energy companies to wring resources from stubborn underground formations.[21] To unlock methane from hard shale rocks, energy companies use hydraulic fracturing, a technique that has come under scrutiny following allegations that it was the cause of pollution of rivers and underground drinking water sources.[22] The environmental and public health concerns surrounding hydraulic fracturing are extremely contentious and will be addressed in the latter half of this section; in the meantime it is important to understand how the process of hydraulic fracturing works.

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17. U.S. Envtl. Prot. Agency, *Natural Gas Extraction–Hydraulic Fracturing*, U.S. ENVTL. PROT. AGENCY, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm (last updated Feb. 14, 2013).
18. DEPT. OF ENERGY, *supra* note 2, at ES-3.
19. *Id.* at 13.
20. *Id.* at ES-3.
21. Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need to Revisit Regulation*, 20 FORDHAM ENVTL. L. REV. 115, 115 (2009).
22. N.Y. TIMES, *supra* note 6.

A. What is Hydraulic Fracturing and How Does It Work?

The natural gas within a shale gas bed usually exists between fine pores of the shale formation. These fine pores make the formation naturally not very permeable.[23] In order to create greater permeability within the shale formation, hydraulic fracturing is used as a "formation stimulation practice," allowing gas to flow more readily toward the wellbore.[24] Fracturing fluid is pumped into the formation from the well bore at a predetermined rate and pressure in order to create fractures in the shale rock.[25] The fracturing fluid is primarily water-based fluid mixed with additives that help to carry a propping agent—usually sand—into the fractures.[26] Once the pumping of the fluids has stopped, the proppant remains within the fractures and acts to "prop" open the fracture so that the gas may flow.[27] The newly created "fractures" allow the once stagnant gas within the formation to now travel freely through the fracture to a point where it can be recovered.

The ultimate goal of a successful hydraulic fracturing operation is to "ensure that the fractures connect the wellbore to the area of the shale or coalbed in which production has been stimulated, allowing the gas to flow into the well.[28] There are several methods of hydraulic fracturing.[29] Although each method employed requires some sort of fluid, the type of method utilized depends on the type of formation, the resource (oil or gas) being extracted, and the "tightness" of the formation.[30]

B. The Dangers Associated With Hydraulic Fracturing

1. The Chemicals Used in Hydraulic Fracturing Fluid

The main concern surrounding hydraulic fracturing is the potential for fracking fluid to contaminate underground drinking water sources. In any given hydraulic fracturing treatment, millions of gallons of water-based fracturing fluids mixed with proppant materials are pumped into the shale formation.[31] Relative to the amount of water used in any given hydraulic fracturing procedure, the overall concentration of additives is small, between 0.5% and 2%, with water making up 98% to 99.5% of

23. DEPT. OF ENERGY, *supra* note 2, at 56.
24. *Id.*
25. *Id.*
26. *Id.*
27. *Id.*
28. Wiseman, *supra* note 21, at 119.
29. *Id.*
30. *Id.*
31. DEPT. OF ENERGY, *supra* note 2, at 61.

the fracturing fluid.[32] However, when we consider that over 2 million gallons of fracturing fluid may be used throughout the process, that 2% begins to look a lot larger.[33] Up to 40,000 gallons of additives may be pumped into the ground at any given site. This has led to public concern, and, in early 2011, the United States House of Representatives Committee on Energy and Commerce commissioned a report on the chemicals used in hydraulic fracturing.[34]

The committee report surveyed the 14 leading oil and gas service companies practicing hydraulic fracturing.[35] Between 2005 and 2009, these 14 companies used more than 2,500 different hydraulic fracturing products containing 750 chemicals and other components.[36] Not including water, the combined companies used a total of 780 million gallons of hydraulic fracturing products between 2005 and 2009.[37] Although some of the components of the hydraulic fracturing products were generally harmless (such as salt, citric acid, instant coffee and walnut hulls), some were extremely toxic (such as benzene and lead).[38] Methanol, a hazardous air pollutant and a candidate for potential regulation under the Safe Drinking Water Act, was the most widely used chemical in hydraulic fracturing during this time period.[39] Methanol was used in 342 hydraulic fracturing products.[40]

Additionally, within more than 650 different products used in hydraulic fracturing, the oil and gas service companies used "products containing 29 chemicals that are: (1) known or possible human carcinogens; (2) regulated under the Safe Drinking Water Act for their risks to human health; or (3) listed as hazardous air pollutants under the Clean Air Act.[41] The BTEX compounds—benzene, toluene, xylene, and ethylbenzene—fall under all three of the above categories and over the five year study

32. *Id.*
33. *See id.* at 58.
34. U.S. H.R. COMM. ON ENERGY AND COMMERCE MINORITY STAFF, *supra* note 9, at 1.
35. *Id.* at 1.
36. *Id.*
37. *Id.*
38. *Id.*; *see also id.* at 13 (Table of chemical components of hydraulic fracturing products, 2005-2009).
39. *Id.*; *see also id.* at 6, tbl.1 (Chemical components appearing most often in hydraulic fracturing products used between 2005 and 2009); *id.* at 8, tbl.3 (Chemical components of concern).
40. *Id.* at 23.
41. *Id.* at 1.

period, 11.4 million gallons of products containing at least one BTEX chemical were injected during the hydraulic fracturing process.[42]

In some cases, companies may be injecting fluids with a limited understanding of the potential risks to human health and the environment created by the chemicals within the mixture.[43] These situations may occur when a company obtains hydraulic fracturing products from third-party manufacturers.[44] There were also cases where the committee report was unable to identify and evaluate certain components of injection fluid because some chemical components of hydraulic fracturing fluids used by companies were listed as "trade secret."[45]

Concerns about the safety of hydraulic fracturing persist, and a quick evaluation of the types and amount of chemicals used make these concerns reasonable. Underground water supply is at greatest risk from hydraulic fracturing, due to both the large amount of water needed during fracturing,[46] and the large amount of unnatural chemicals pumped into the ground that could flow into and pollute drinking water sources.[47]

2. Reduction in Water Supply Caused by Hydraulic Fracturing

The amount of water needed for any given hydraulic fracturing operation varies. It depends on the particular well site and can also vary on the shale formation being fracked.[48] Oil and gas companies use water from a variety of sources to meet the high demand for water, including rivers, lakes, ground water, private sources, municipal water, and re-used produced water.[49] Most of the producing shale formations occur in areas known for high precipitation. Due to growing populations, industrial demand, and seasonable variability, however, it may be difficult to meet the needs of shale gas development and still satisfy regional needs for water.[50]

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42. *Id.* at 2.
43. *Id.* at 12.
44. *Id.*
45. *Id.* at 11.
46. DEPT. OF ENERGY, *supra* note 2, at 64.
47. U.S. ENVTL. PROT. AGENCY, EPA 816-R-04-003, EVALUATION OF IMPACTS TO UNDERGROUND SOURCES OF DRINKING WATER BY HYDRAULIC FRACTURING OF COALBED METHANE RESERVOIRS 3–6 (June 2004) (recognizing that when hydraulic fracturing fluids are injected into formations, the following scenarios are of potential concern: the hydraulically induced fracture may extend from the target formation into an underground source of drinking water; or the hydraulically induced fracture may connect with natural (existing) fracture systems and/or porous permeable formations, which may facilitate the movement of fracturing fluids into an underground source of drinking water).
48. DEPT. OF ENERGY, *supra* note 2, at 64, exhibit 37.
49. *Id.* at 65.
50. *Id.*

The need for water during a hydraulic fracturing operation is not spread out over a long period. Operations need the water when drilling activity is occurring, requiring that water be on hand in a relatively short period of time.[51] This quick spike in water demand created by the hydraulic fracturing operation could affect fish and other aquatic life, fishing and other recreational activities, municipal water supplies, and other industries, such as power plants.[52] Currently, however, the water supply needs of hydraulic fracturing operations pale in comparison to other industrial uses, such as electrical generation.[53] As hydraulic fracturing becomes more pervasive, water supply may become a more contentious issue. For purposes of this comment, however, it is important to understand that it will play a role in how we manage water supply for these operations, but that a decrease in water supply is not the most pressing side-effect of hydraulic fracturing.

3. Pollution of Underground Drinking Water

The EPA has recognized the potential for contamination of drinking water due to hydraulic fracturing.[54] As has already been noted, a large amount of additives are mixed with water and sand to create the hydraulic fracturing fluid. The fluid is then pumped into a shale or coal formation at high pressures to induce fractures within the rock. This allows for methane gas to freely flow to the wellhead. These additives can range from the harmless, to the obscure, and to the downright toxic.[55] After the formations are hydraulically fractured and the proppants are in place, the injected fluids and groundwater are pumped out of the production well, with a portion of the injected fluids remaining in the ground.[56]

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51. *Id.*
52. *Id.*
53. *Id.*

> To put shale gas water use in perspective, the consumptive use of fresh water for electrical generation in the Susquehanna River Basin alone is nearly 150 million gallons per day, while the projected total demand for peak Marcellus Shale activity in the same area is 8.4 million gallons per day.

Id.

54. *Id.*
55. *See* U.S. H.R. COMM. ON ENERGY AND COMMERCE MINORITY STAFF, *supra* note 9, at 6.
56. Legal Envtl. Assistance Found. v. EPA, 118 F.3d 1467, 1471 (11th Cir. 1997).

The Marcellus shale alone spans a large area of the east coast, from as far south as Tennessee to as far north as upstate New York.[57] Thus, as hydraulic fracturing grows in prevalence, it will not occur in isolation of human populations.[58] For example, residents in both New York and Pennsylvania are increasingly upset with large-scale exploration activities so close to their once quiet communities.[59]

Underground sources of drinking water are at the highest risk of contamination from hydraulic fracturing operations. In a 2004 report on the impacts of underground drinking water sources by hydraulic fracturing in coalbed methane reservoirs, the EPA stated that "[i]n many coalbed methane-producing regions, the target coalbeds occur within [underground sources of drinking water], and the fracturing process injects stimulation fluids directly into" the underground drinking water source.[60] Despite numerous water quality incidents spanning four of the major coalbed methane basins, the EPA ultimately concluded that "based on the information collected and reviewed, the injection of hydraulic fracturing fluid into coalbed methane wells poses little or no threat to underground sources of drinking water and does not justify additional study at this time."[61] The EPA came to this conclusion despite numerous reports of high levels of methane in wells turning water cloudy with grayish sediment a day or two after nearby fracturing, decreased water flow in wells after fracturing, and increased levels of hydrogen sulfide and then anaerobic bacteria.[62] The report also included instances of impacts unrelated to drinking water, but startling nonetheless. Near a methane coalbed development area in Colorado, the EPA observed areas where patches of grass and trees were turning brown and dying and residents complained of higher levels of methane in the soil.[63] The EPA also reviewed a report from an individual to the Natural Resources Defense Council claiming that fluid from a hydraulic fracturing operation had drained near her home and killed all animal and plant life in its path, with her well becoming contaminated with a "petroleum-smelling fluid" soon thereafter.[64]

These instances of water pollution and other environmental impacts, however, are not restricted to only coalbed methane exploration. There is also evidence of methane contamination of drinking water associated

57. JAMES L. COLEMAN ET AL., ASSESSMENT OF UNDISCOVERED OIL AND GAS RESOURCES OF THE DEVONIAN MARCELLUS SHALE OF THE APPALACHIAN BASIN PROVINCE, 2011 (Aug. 23, 2011), *available at* http://pubs.usgs.gov/fs/2011/3092/.
58. Wiseman, *supra* note 21, at 126.
59. *Id.* at 127.
60. U.S. ENVTL. PROT. AGENCY, *supra* note 47, at 1–6.
61. *Id.*; *see also* Wiseman, *supra* note 21, at 129, 131.
62. *See* Wiseman, *supra* note 21, at 130–31.
63. *Id.*
64. *Id.*

with shale-gas extraction.[65] In active gas-extraction areas (one or more wells within 1 km), methane concentrations in drinking water wells increased to near potentially explosive levels.[66] In a study of 60 wells in northeast Pennsylvania and upstate New York analyzed for dissolved-gas concentrations of methane, concentrations of methane were substantially higher closer to natural-gas wells as opposed to nonactive drilling and extraction areas.[67]

IV. CURRENT FEDERAL REGULATION OF HYDRAULIC FRACTURING

Hydraulic fracturing certainly hasn't been beyond the radar of federal oversight. In the wake of an 11th Circuit decision,[68] the EPA decided to assess the potential for hydraulic fracturing of coalbed methane wells to contaminate underground sources of drinking water. The EPA's decision to conduct the study was also based on concerns voiced by individuals who may be affected by coalbed methane development, Congressional interest, and the need for additional information before the EPA could make any further regulatory or policy decisions regarding hydraulic fracturing."[69] The EPA ultimately concluded that the injection of hydraulic fracturing fluids into coalbed methane wells posed little or no threat to underground sources of drinking water.[70]

A year after the study was published by the EPA, and likely building off its conclusion that hydraulic fracturing poses little threat to underground sources of drinking water, Congress passed the Energy Policy Act of 2005, exempting all hydraulic fracturing from the definition of underground injection in Section 1421 of the Safe Drinking Water Act.[71] Shortly after the study was released, an EPA whistle-blower said the agency had been strongly influenced by industry and political pressure.[72]

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65. STEPHEN G. OSBORN ET AL., METHANE CONTAMINATION OF DRINKING WATER ACCOMPANYING GAS-WELL DRILLING AND HYDRAULIC FRACTURING 1, *available at* http://www.eenews.net/assets/2011/05/09/document_pm_01.pdf (last visited Feb. 10, 2013).
66. *Id.*
67. *Id.* at 2.
68. *See Legal Envtl. Assistance Found.*, 118 F.3d at 1478.
69. U.S. ENVTL. PROT. AGENCY, *supra* note 47, at ES-7.
70. *Id.* at ES-16.
71. Energy Policy Act of 2005, Pub L. No. 109–58, § 1(a), 119 Stat. 594 (2005). However, the use of diesel fuel in hydraulic fracturing operations is forbidden under the Act. *Id.*; *see also* Wiseman, *supra* note 21, at 145.
72. Ian Urbina, *Pressure Limits Efforts to Police Drilling for Gas*, N.Y. TIMES (Mar. 3, 2011), http://www.nytimes.com/2011/03/04/us/04gas.html?_r=1&ref=drillingdown.

Other federal laws governing aspects of natural gas exploration do exist. None of them come close, however, to achieving full-scale regulation of all aspects of the hydraulic fracturing process. These laws include the Clean Water Act (CWA) and the Clean Air Act (CAA). The CWA regulates surface discharges of water associated with gas drilling and production, as well as storm water runoff from production sites.[73] The CAA limits air emissions from engines, gas-processing equipment, and other sources associated with drilling and production.[74]

Congress has since attempted to undo the exemption given to hydraulic fracturing. In 2009, Congress introduced twin bills to amend the Safe Drinking Water Act and give the EPA authority to regulate hydraulic fracturing.[75] Dubbed the Fracturing Responsibility and Awareness of Chemicals (FRAC) Act, it would also require the energy industry to disclose the chemicals it uses in their hydraulic fracturing fluid.[76] However, until now this bill has yet to gain significant traction and hydraulic fracturing remains exempt from federal regulation.

V. HYDRAULIC FRACTURING IN THE COURTS

With a lack of federal regulation, some landowners are resorting to the judiciary to either protect their property interests from the dangers of hydraulic fracturing or to recover for losses incurred due to hydraulic fracturing operations. The grounds for these claims are usually based in trespass or nuisance, and involve questions of property rights. Courts have been hesitant, however, to allow for recovery under trespass, and nuisance claims are likely insufficient to adequately address the impacts of hydraulic fracturing.

A. Trespass

The question of whether hydraulic fracturing operators may be held liable for trespass for induced fractures that traveled into a neighboring subsurface property came before the Texas Supreme Court in 2008.[77] In *Coastal Oil*, the court was faced with determining "whether subsurface hydraulic fracturing of a natural gas well that extends into another's property is a trespass for which the value of gas drained as a result may

73. DEPT. OF ENERGY, *supra* note 2 at 25.
74. *Id.*
75. Abrahm Lustgarten, *FRAC Act–Congress Introduces Twin Bills to Control Drilling and Protect Drinking Water*, PROPUBLICA (June 9, 2009), http://www.propublica.org/article/frac-act-congress-introduces-bills-to-control-drilling-609.
76. *Id.*
77. Coastal Oil & Gas Corp. v. Garza Energy Trust, 268 S.W.3d 1, 4 (Tex. 2008).

be recovered as damages."[78] The court held that the rule of capture bars recovery of such damages.[79] In a concurring opinion, one justice wrote directly that "a claim for 'trespassby-frac' is non-existent in either drainage or nondrainage cases."[80]

B. Private Nuisance Remedies

Nuisance is characterized as a "nontrespassory invasion of another's interest in the private use and enjoyment of land."[81] Citing section 822 of the Restatement (second) of Torts, "one is subject to liability for private nuisance if, but only if, his conduct is a *legal cause* of an invasion of another's interest in the private use and enjoyment of land, and the invasion is. . . intentional and unreasonable . . . "[82] When hydraulic fracturing operations result in the contamination or shortage of drinking water, nuisance claims seem like a plausible option for recovery by landowners. However, the difficulty in identifying contaminants or other effects presents problems with causation in nuisance suits.[83] In addition, nuisance claims can only be made after a landowner's property has been affected by hydraulic fracturing, impacts that may linger indefinitely. Thus, nuisance suits will likely be insufficient to prevent unwelcome hydraulic fracturing operations from entering a community, or to adequately regulate the practice to prevent future harmful effects.

Although landowners have a property interest in natural gas lying under their property,[84] the doctrine of *ferae naturae* and the rule of capture allow oil and gas companies to "capture" that gas by drilling and inducing fractures from neighboring properties.[85] The rule of capture also makes it difficult to recover for trespass from fractures entering subsurface property. Damages resulting from the trespass are difficult to prove, and once the gas migrates away from the property, so does the landowner's property interest in the natural gas. Nuisance claims against hydraulic fracturing operations may allow a landowner to recover for harm caused by the operation, but it will likely not be enough to halt the

78. *Id.*
79. *Id.*
80. *Id.* at 30.
81. Thomsen v. Greve, 550 N.W.2d 49, 54 (Neb. Ct. App. 1996).
82. *Id.*
83. Wiseman, *supra* note 21, at 157.
84. U.S. Steel Corp. v. Hoge, 468 A.2d 1380, 1383 (Pa. 1983).
85. *Id.*

operation or force proper oversight over the practice because oil and gas companies will likely only be forced to pay for damages.[86] Additionally, courts have historically been hesitant to impose injunctions on companies that pollute under the belief that the issue is more adequately dealt with at an industry level by elected officials.[87] Therefore, common law claims against oil and gas companies for hydraulic fracturing operations are likely inadequate to protect the public from the possible impacts of hydraulic fracturing.

VI. REGULATION AT THE STATE LEVEL

Given the lack of regulation at the federal level and the court's hesitance towards applying common law principles to regulate hydraulic fracturing operations, state regulation has become and will continue to be the primary mechanism for the regulation of hydraulic fracturing. The adequacy of such regulation, however, is still in question.

Most states continue to regulate hydraulic fracturing as part of their general permitting process for drilling. This includes Texas, where regulation occurs through "approval of the drilling permit application," coinciding with additional controls over groundwater withdrawals and surface disposals.[88] In Texas, permits are required to drill, deepen, plug back, or reenter any oil well, but an environmental review or assessment of a proposed drilling operation is not required by the state.[89] Hydraulic fracturing operations in Texas must receive approval from the Texas Commission on Environmental Quality, which may require steps to protect groundwater.[90] Disposal methods are also regulated in Texas to protect both surface and subsurface waters.[91]

Similarly, Montana uses its oil and gas permitting requirements to regulate hydraulic fracturing. Although the state requires general reporting of operations and an opportunity for landowners to contest the operator's spacing at a hearing, provided no issues exist, the board will typically approve the request.[92]

Colorado, New Mexico and Pennsylvania all have relatively strong regulations. Pennsylvania's oil and gas regulations and best management

86. *See generally* Boomer v. Atlantic Cement Co., 257 N.E.2d 870, 873 (N.Y. 1970) (denying a permanent injunction to halt a cement making operation because of the large disparity in economic consequences of the nuisance and of the injunction).
87. *Id.*
88. Wiseman, *supra* note 21, at 157.
89. *Id.*
90. *Id.*
91. *Id.*
92. *Id.* at 158.

practices mention hydraulic fracturing extensively.[93] In addition, the state has separate regulations addressing hydraulic fracturing in the Marcellus Shale.[94] An application for a permit to drill in Pennsylvania is submitted to the Department of Environmental Protection and must include the proposed location of the well and "the name of all surface landowners or water purveyors whose water supplies are within 1,000 feet of the proposed well location."[95] In the event that water quality becomes impaired due to hydraulic fracturing, the Department "presumes that well operators are responsible for any pollution within six months after drilling or completion of a well that is within 1,000 feet of a water well, unless the well operator provides an affirmative defense."[96] Similar to Texas, Pennsylvania also has specific requirements for the disposal of waste and wastewater from hydraulic fracturing, which includes the required preparation and completion of a "Preparedness, Prevention and Contingency (PPC) Plan for Oil and Gas Development," by an operator.[97] The PPC Plan must list the chemicals used in the hydraulic fracturing fluid, and describe the wastes generated and methods for clean-up, disposal, or reuse of waste.[98]

In Colorado, the Colorado Oil and Gas Conservation Commission (COGCC) created by the Oil and Gas Conservation Act, regulates oil and gas development. The State has some of the most comprehensive sets of regulations and statutes governing oil and gas exploration for the protection of public health and the environment[99] and has even gone beyond what is required by the federal government in protecting water resources.[100] In 2007, the Colorado Legislature expanded the COGCC to include more environmental interests and enacted the Colorado Habitat

93. *Id.* at 164.
94. *Id.*
95. 58 PA. CONS. STAT. ANN. § 601.201(a)(2)(b) (2011).
96. Wiseman, *supra* note 21, at 163–64.
97. *Id.* at 164.
98. *Id.*
99. *See generally* Intermountain Oil and Gas BMP Project, *Colorado Statutes, Regulations, Guidelines, and Policies Related to Oil and Gas Surface Operations*, INTERMOUNTAIN OIL AND GAS BMP PROJECT, http://www.oilandgasbmps.org/laws/colorado_law.php (last visited Mar. 2, 2013).
100. The Energy Policy Act of 2005 broadened exemption for gas exploration and development from Clean Water Act stormwater permit requirements. Despite this federal legislation the state of Colorado decided in January 2006 to continue to enforce its more stringent regulation requiring operators to get stormwater permits for one to five acre construction sites. *Oil and Gas Resource Development*, RED LODGE CLEARINGHOUSE (Aug. 31, 2010), http://www.rlch.org/content/oil-and-gas-resource-development.

Stewardship Act to plan and manage oil and gas operations in a manner that balances development with wildlife conservation.[101]

In 2009, the COGCC adopted new regulations that further protect public health and the environment. These new regulations require the oil and gas industry to consider threats to human health and wildlife at the time a company applies for a permit, and to establish protection zones around streams situated in watersheds that provide drinking water supplies.[102] Companies must report which chemicals they use in drilling operations and allow state and wildlife officials to formally consult on oil and gas development applications.[103] Upon completion of the drilling activity, an oil or gas well site must be cleaned up to general health standards.[104] There are also limits on odors where oil and gas development is occurring near homes and schools in northwestern Colorado.[105] All development proposals require landowner notification and public comment periods.[106] Operators must also manage erosion and limit water pollution from oil and gas operations during storms and snow run-off season.[107] The modified rules since 2009 have provided for relatively comprehensive regulation of all aspects of hydraulic fracturing, addressing both underground and surface impacts as well as allowing opportunities for citizens to voice concerns about a proposed hydraulic fracturing project.[108]

New Mexico has made similar changes to its oil and gas rules as hydraulic fracturing becomes increasingly more common throughout the state. The State's new "pit rule" governing disposal of wastes from oil and gas operations places limitations on chemicals sometimes found in hydraulic fracturing fluid.[109] Operators must sample the drilling area for chemicals like benzene or BTEX and ensure that they do not exceed designated concentration limits.[110]

In a first of its kind response to the rush to drill in the Marcellus Shale, the New York State Senate issued a temporary moratorium on natural gas exploration in August 2010.[111] The moratorium was put in place to give the State adequate time to assess the risks of hydraulic fracturing and

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101. *Id.*
102. *Id.*
103. *Id.*
104. *Id.*
105. *Id.*
106. *Id.*
107. *Id.*
108. Wiseman, *supra* note 21, at 162.
109. *Id.*
110. *Id.* at 162–63.
111. Mireya Navarro, *N.Y. Senate Approves Fracking Moratorium*, N.Y. TIMES (Aug. 4, 2010), http://green.blogs.nytimes.com/2010/08/04/n-y-senate-approves-fracking-moratorium/#.

move forward in a responsible manner.[112] New York's complete ban on all new hydraulic fracturing operations, although temporary, was the first of its kind in the country. By completely banning all new hydraulic fracturing operations in the short term, the Legislature recognized that there are obvious dangers involved with hydraulic fracturing and they are not ready to move forward until these dangers are completely understood.

Those who argue against comprehensive federal regulation say that state regulation can more effectively address the regional and state-specific character of the activities, compared to one-size-fits-all regulation at the federal level.[113] The states have broad powers to regulate, permit and enforce the drilling and fracture of the well, production and operations, management and disposal of wastes, and abandonment and plugging of the well.[114] However, states are not likely to have comprehensive regulation of the entire hydraulic fracturing process. Often, multiple agencies are involved, having jurisdiction over different activities and aspects of development.[115] State laws generally give an agency or director of state oil and gas operations discretion to require whatever is necessary to protect human health and the environment.[116] Requirements may come in the form of written rules or regulations, and some are added to permits on a case-by-case basis based on environmental review, site inspection, public comments, or commission hearings.[117]

Although some states have taken an aggressive approach to regulate hydraulic fracturing, it is still questionable whether the current patchwork of state regulation is adequate to protect the public from the dangers of hydraulic fracturing, as even relatively stringent oil and gas regulations fall under scrutiny. Therefore, regulation at the federal level is necessary to ensure that the oil and gas industries are continuously using best management practices during hydraulic fracturing operations and the public health is at the forefront of industry concern. However, granting full authority to regulate hydraulic fracturing to the federal government may diminish the hard work done at the state level in states like Colorado. Therefore, in order to establish a national standard for hydraulic fracturing

112. *Id.*
113. DEPT. OF ENERGY, *supra* note 2, at 25.
114. *Id. at 26.*
115. *Id.*
116. *Id.*
117. *Id.*

operations but still maintain state involvement in the regulatory process, a system of cooperative federalism is essential.

VII. COOPERATIVE FEDERALISM AND HYDRAULIC FRACTURING

Citizen complaints of contamination of underground sources of drinking water near hydraulic fracturing operations are known to have occurred across the country where the technique is used.[118] State agencies that have oversight responsibility for hydraulic fracturing operations have allegedly been unresponsive to concerns and complaints from the public.[119] In New Mexico, where there is a fairly extensive permitting process for hydraulic fracturing, the EPA's 2004 investigation found two residents who reported that the quality of their water was affected by hydraulic fracturing.[120] In 2007, a Colorado family reported a pump house exploding and contamination of water during hydraulic fracturing of nearby wells.[121] Despite state regulation in place to monitor hydraulic fracturing operations, stories of citizen complaints place doubts on how well these regulations are actually protecting the public health from the dangers of hydraulic fracturing.

Up until now, this comment has looked at the regulation of hydraulic fracturing from the standpoint of either/or, either state or federal regulation. This strict separation of governmental authority between the state and federal governments is known as dual federalism.[122] Environmental law became federalized only after a long history of state failure to protect what had come to be viewed as nationally important interests,[123] although their effects may be local in nature. As national regulation expanded in scope, the range of potential conflicts between federal and state environmental regulation increased.[124] These same concerns are echoed today as we discuss the appropriate way to regulate hydraulic fracturing, a seemingly local concern, with strong national interests in the safe and sustainable extraction of natural gas. Therefore, effective regulation of

118. NATURAL RES. DEF. COUNCIL, HYDRAULIC FRACTURING OF COALBED METHANE WELLS: A THREAT TO DRINKING WATER 3 (Jan. 2002).

119. *Id.* at 4.

120. Amy Mall, *Incidents Where Hydraulic Fracturing is a Suspected Cause of Drinking Water Contamination*, NATURAL RES. DEF. COUNCIL (Dec. 19, 2011), http://switchboard.nrdc.org/blogs/amall/incidents_where_hydraulic_frac.html.

121. *Id.*

122. Kristen H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 175 (2006).

123. Robert V. Percival, *Environmental Federalism: Historical Roots and Contemporary Models*, 54 MD. L. REV. 1141, 1144 (1995).

124. *Id.* at 1177.

hydraulic fracturing requires some form of cooperative federalism in which federal and state authorities work together to achieve national goals.

The idea of cooperative federalism rejects dual federalism and emphasizes the benefits of overlapping federal and state power by dismissing the idea that "states need a sphere of authority protected from the influence of the federal government."[125] According to cooperative federalism, the center of power alternates between the federal and state governments, and any matter may presumptively fall under the authority of both the federal and the state governments.

A. Benefits of Cooperative Federalism

The overlapping regulatory jurisdiction allowed through cooperative federalism is ideal for environmental policymaking, and provides important advantages over nonoverlapping allocations of authority between the state and federal governments. Values like plurality, dialogue, and redundancy are supported by cooperative federalism[126] and its advantages include greater regulatory competition, policy innovation, and resistance to monopolization and interest group capture.[127]

It is possible that oil and gas companies may be hesitant to initially drill for natural gas in states with more stringent regulation, as opposed to states with less regulation where it may be cheaper because there are fewer procedural hoops to jump through. This may create a situation where the natural gas industry focuses its operations on states with fewer regulations in place. Instead of innovating new techniques to continue to frack in states with stricter environmental regulations at a similar cost to previous techniques, companies may continue to use more hazardous techniques at a lower cost in states with fewer regulations. This situation is known as the race-to-the-bottom. A race-to-the-bottom situation creates greater chances of pollution without creating an incentive to innovate new techniques to drill more safely. Regulation at the federal level is optimal given the economies of scale achieved through a single federal standard for a nationally distributed product.[128] This could be achieved through federally mandated minimum standards on hydraulic fracturing operations, forcing every state to maintain the same standard of regulation

125. Engel, *supra* note 122, at 176.
126. *Id.* at 176.
127. *Id.* at 176–77.
128. *Id.* at 177.

of hydraulic fracturing. This would require the industry to innovate new techniques to meet stricter standards at a competitive market cost. Finding the balance between regulation and market competition is key to ensuring that any environmental law does not over regulate to the point of destroying a key industry, but does not under regulate so as to put the natural environment and public health at risk. Minimum national standards on industry practice are one way that this balance may be achieved.

Cooperative federalism also empowers the government to better address social ills through the combined application of state and federal law and resources.[129] "The genius in having multiple levels of government is that if one fails to act, another can step in to solve the problem."[130] If one level of government fails to adequately enforce hydraulic fracturing regulations, the other can step in and make sure it is done. In addition, cooperative federalism combats the excessive influence a particular interest group may have on any one level of government,[131] also known as interest group capture. If an interest group successfully influences a policy at the federal level, under cooperative federalism, the states will have an opportunity to correct the ultimate result, and vice versa.

Cooperative federalism allows for states to function as regulatory laboratories and promotes regulatory innovation.[132] In the context of environmental law, regulatory innovation is especially important because the object of regulation, the environment, is continually changing.[133] This continuous change must be counterbalanced with regulations that can also change to best reflect evolving environmental circumstances. For instance, if hydraulic fracturing were found to cause earthquakes in a certain area,[134] a state may fashion regulations that provide greater notice to the public surrounding an operation, or go as far as to require retrofitting of buildings in the immediate zone of danger of hydraulic fracturing operations. Considerable state autonomy is preserved by cooperative federalism because federal standards are minimum standards with states expressly authorized to establish more stringent controls if they so desire.[135] This theory allows states to address regionally specific needs by enacting stricter regulations.

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129. *Id.* at 178.
130. Erwin Chemerinsky, *Empowering States: The Need to Limit Federal Preemption*, 33 PEPP. L. REV. 69, 74 (2005).
131. Engel, *supra* note 122, at 178–79.
132. *Id.* at 182.
133. *Id.*
134. Recent events have actually suggested a causal link between hydraulic fracturing and an increase in earthquakes. Henry Fountain, *Add Quakes to Rumblings Over Gas Rush*, N.Y. TIMES (Dec. 12, 2011), http://www.nytimes.com/2011/12/13/science/some-blame-hydraulic-fracturing-for-earthquake-epidemic.html?pagewanted=all.
135. Percival, *supra* note 123, at 1175.

Overlapping jurisdictions is a benefit of cooperative federalism, but federal preemption is a serious concern.[136] Federal preemption is explicitly provided for in the Supremacy Clause and leaves the responsibility of generating regulation to the federal government alone.[137] Federal preemption of hydraulic fracturing may allow for greater influence by interest groups who now can focus their lobbying power on one level of government. If cooperative federalism is viewed as a protection against interest group lawmaking, courts should require strong evidence of congressional intent to preempt state law.[138] Stricter state standards are more likely to bring a challenge under federal preemption, therefore a decision in favor of preemption is generally a decision in favor of deregulation, one that courts should be reluctant to find.[139]

B. Regulation of Hydraulic Fracturing Under a Cooperative Federalism Approach

Cooperative federalism has become the predominant approach to federal environmental legislation.[140] In order to take advantage of the benefits of cooperative federalism, regulation of hydraulic fracturing should be modeled after, or be regulated under, federal environmental legislation that already incorporates some form of cooperative federalism.

An examination of existing federal environmental law gives us a glimpse into what the regulation of hydraulic fracturing may look like. The major federal pollution control statutes make federal agencies responsible for establishing national environmental standards that state authorities then may qualify to administer and enforce.[141] These statutes include the Clean Air Act, the Clean Water Act, RCRA, and the Safe Drinking Water Act.[142] Under these federal programs, EPA would establish minimum standards that states could not drop below. The states would be allowed to implement and enforce the federal program so long as: "(1) the states have in place standards at least as stringent as the federal minimums; (2) the federal government retains the authority to enforce the law within the states . . . ; and (3) the federal government retains the

136. Engel, *supra* note 122, at 184.
137. *Id.*
138. *Id.*
139. *Id.* at 186.
140. Percival, *supra* note 123, at 1174.
141. *Id.*
142. *Id.*

option of taking back the program if necessary due to state nonfeasance."[143] These laws generally preserve state regulatory authority to enact standards more stringent than the federal requirements, but preempt all state laws less stringent than, or inconsistent with, the federal minimum standards.[144] In states that choose not to operate and enforce federal environmental programs, the federal authorities will take over operation and enforcement duties.

The Safe Drinking Water Act currently employs a form of cooperative federalism, allowing states primary authority to implement and enforce federally mandated minimum standards.[145] By giving states primary authority to operate an underground injection control program, the Act preserves state autonomy, which allows regionally specific needs to continue to be addressed.[146] By repealing the exemption for hydraulic fracturing under the Safe Drinking Water Act, congress can take advantage of the benefits of cooperative federalism without having to craft an entirely new piece of legislation. However, it is important that the federal minimum standard not be set too low so as to make it inconsequential to those states that desire stringent regulation of hydraulic fracturing. Regulation of hydraulic fracturing through cooperative federalism is a sort of middle ground between those that believe the states should retain full authority over the practice, and those that believe states are doing to little to protect the public and that comprehensive federal legislation is needed to oversee all hydraulic fracturing operations. Cooperative federalism ultimately protects national interests in safely extracting natural gas, but provides states an avenue to pursue their own interests in exploitation and environmental protection.

VIII. CONCLUSION

The continued expansion of hydraulic fracturing to exploit the country's rich natural gas deposits is at odds with competing concerns of environmental protection. On the one hand, the exploitation of natural gas may dramatically decrease our dependence on foreign oil and may possibly help curb the effects of climate change by reducing our greenhouse gas emissions. On the other hand, the exploitation of natural gas through hydraulic fracturing could have a tremendous impact on the public health and the environment. With these concerns in mind, in order to adequately protect vital underground sources of drinking water and the

143. Engel, *supra* note 122, at 180.
144. *Id.* at 180 n.111.
145. 42 U.S.C. § 300h(b)(1) (2005).
146. 42 U.S.C. § 300h(b)(3)(A).

environment from the dangers of hydraulic fracturing, some form of federal legislation should be implemented.

Currently, hydraulic fracturing is exempt from federal regulation, creating a void filled by a patchwork of regulation at the state level that may or may not be adequately protecting the pubic. Entrusting the federal government with full authority to oversee hydraulic fracturing operations, however, may not be the best solution either. The federal government's ability to set national standards for hydraulic fracturing may ignore regions that are more susceptible to pollution and therefore may require more stringent regulation. In addition, when only one level of government, either state or federal, is given full authority, it creates a system which can more easily fall victim to capture by special interest groups. This could lead to state or national standards that are far too lenient. In order to preserve state autonomy but still create national standards that all oil and gas companies must abide by, cooperative federalism is the best approach. Cooperative federalism allows for overlapping authority between the state and federal government and provides important advantages over static allocation of regulatory authority between either the state or federal government. These benefits include the potential for innovative regulatory solutions, fewer opportunities for regulatory capture by interest groups, and policy making at multiple levels of government.

Cooperative federalism and the benefits that come along with it can be realized by Congress today through the repeal of the exception for hydraulic fracturing under the Safe Drinking Water Act. Hydraulic fracturing continues to pose a danger to the public and those that believe that regulatory authority should remain with the states are generally those that are benefitting most from the practice of hydraulic fracturing and want to continue to do so under inadequate state oversight. However, those that argue for complete regulatory authority being vested in the federal government do not clearly understand the implications of such an undertaking. Therefore, cooperative federalism is the only realistic approach that both creates national standards for hydraulic fracturing and retains state autonomy and should be implemented today through the Safe Drinking Water Act.